

Attachment E:

Summaries of Population Characteristics By Major Population Groupings for Interior Columbia Basin Chinook and Steelhead ESUs.

Salmonid population structure is hierarchical, from species to sub-population, reflecting varying degrees of exchange of individuals. Two levels in this hierarchy have been formally defined for recovery planning efforts ESUs and populations. A population is defined as a group of individuals that are demographically independent from other such groups over an 100-year time period. “Major population groupings” are groups of populations that share similarities within the ESU. They are defined on the basis of genetic, geographic (hydrographic), and habitat considerations (McClure et al. 2003). These major population groupings are analogous to “strata” as defined by the Lower Columbia-Upper Willamette TRT and “geographic regions” described by the Puget Sound TRT. The ICTRT has developed draft viability criteria for each of these three levels.

Achieving the MPG level criteria across groupings would generally ensure that populations are functioning across a range of physical and ecological settings reflective of the historical ESU, thereby supporting the expression of genetic and phenotypic diversity. ESUs with only one population or MPG may require more stringent population or MPG criteria to be at low risk.

A summary of population characteristics organized by MPGs within specific ESUs is provided in the following section. Information on a set of key indicators of diversity and spatial complexity at the population level are summarized for each grouping.

Dominant ecoregions - the tributary reaches associated with individual populations can fall within different major ecoregions. Ecoregions represent provincial level differences in vegetation, lithography and elevation.

Life History types (Adults). Differences in adult return timing are generally related to flow and temperature conditions conducive to spawning and incubation requirements. Although multiple adult timing patterns are present within some populations, between population diversity is an important consideration.

Spawning Habitat Quantity: (expressed as kilometers weighted to high quality equivalents). Some MPGs historically included a significant proportion of large and complex populations. MPG viability criteria highlight the need to consider these populations in recovery scenarios.

Median Spawning Elevation (based on intrinsic potential analysis): Adaptation to temperature/precipitation levels can be an important component of diversity within ESUs. Elevation is generally considered a good surrogate for precipitation and temperature. Meeting the MPG population criteria described above would maintain viable populations across the historical range in elevation associated with each ESU (see attached figures).

Valley/Stream Width Ratio: Tributary reaches within unconfined wide valleys provide relatively stable, complex habitats for juvenile rearing (summer and winter phases). The presence of a significant amount of such habitat within the freshwater rearing area associated with a particular population promotes the expression of alternative juvenile life histories.

Upper Columbia Spring Chinook ESU

The ICTRT has identified three extant populations in this ESU. In addition, the Okanogan basin had sufficient intrinsic habitat potential to support at least one additional viable population. The region above Chief Joseph and Grand Coulee Dams, blocks to anadromous migration, could have supported several additional spring chinook populations. Some of these areas were more conducive to summer type chinook life history patterns and may have supported populations in a different ESU. The Methow, Entiat and Wenatchee populations constitute a MPG. Spring chinook production in the Okanogan River drainage, due to habitat differences, would likely have represented a separate MPG.

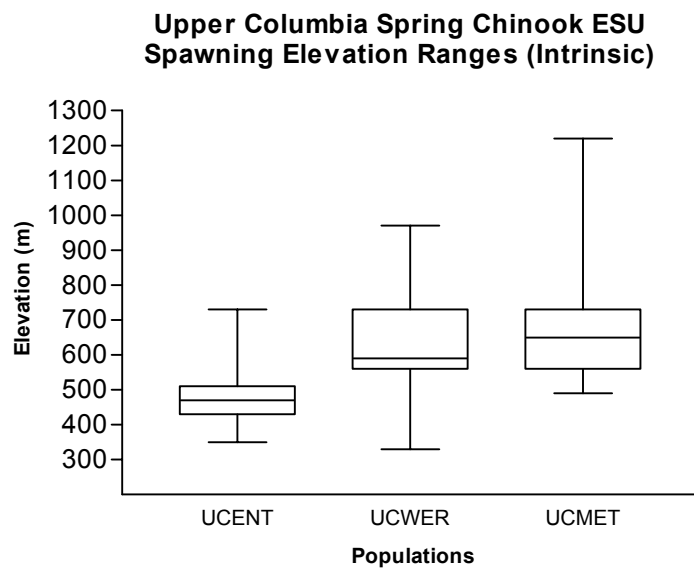
The North Cascades MPG includes two populations in the Very Large category (Wenatchee and Methow Rivers). The Entiat population is in the Basic size category. Given the small number of remaining populations in the ESU relative to historical, the ICTRT recommends that all three of the extant populations in this ESU achieve viable status.

The Okanogan River Spring chinook population is believed to have been extirpated. Given the small number of extant Upper Columbia River Spring Chinook populations, restoring spring chinook production in the Okanogan basin would contribute to ESU viability. Restoring production in the Okanogan would also expand the set of habitat/environmental conditions supporting production for this ESU towards the historical range.

Table E-1: *UPPER COLUMBIA RIVER SPRING CHINOOK ESU. Population characteristics.*

Major Population Group	Population	Weighted Area Category	Dominant Ecoregion	Life History (adults)	Median Spawning Elev.	Valley Habitat (prop.)
<i>Eastern Cascades</i>	Wenatchee	Very Large	North Cascades	Spring	590	.38
	Methow	Very Large	North Cascades	Spring	650	.35
	Entiat	Basic	North Cascades	Spring	470	.33
	Okanogan River (ext)		Columbia Plateau			

Figure E-1



Snake R. Spring/Summer Chinook ESU

The Snake River Spring/Summer Chinook ESU includes 30 extant populations including anadromous steelhead distributed among five Major Populations Groupings. Four of those groupings include four or more populations each. The historical Snake River Steelhead ESU likely included populations in the Clearwater drainage and also extended above the Hells Canyon Dam complex. Habitat analyses and historical records of fish presence indicate that the Clearwater River basin and the area above Hells Canyon Dam supported several additional anadromous populations.

The *Upper Salmon River MPG* contained 9 historical populations, one of which, Panther Creek, was extirpated as a result of water quality problems. Two populations in this group are rated as Very Large based on the historical intrinsic spawning potential assessment and two as Large. Two additional populations within this MPG were rated as Intermediate in size - the Upper Salmon tributaries and the extirpated Panther Creek population. The remaining three populations were classified as Basic in terms of historical spawning habitat. The ICTRT guidelines at the MPG level would require that five populations in this group exceed population VSP thresholds, the remainder of the populations would need to exceed minimum maintenance guidelines. At least two of the minimum of five viable populations should be from either the Very Large or Large relative size categories. All three major adult life history types identified by the ICTRT are present in this MPG. Therefore the five populations meeting VSP thresholds would need to include spring, spring/summer and summer adult life history patterns. At present, the Pahsimeroi R. is the only population in the MPG exhibiting the summer timing pattern. Two populations exhibit the spring/summer combined patterns. The remainder are believed to be limited to the spring chinook pattern. Populations within this MPG cover a wide range of spawning elevations - the North Fork Salmon population has a median spawning elevation of approximately 1200 m, the Upper Mainstem tributary population median elevation is above 2100m. The principle ecoregions associated with populations in this MPG are the Idaho Batholith and the Middle Rockies. A number of populations in this MPG included a high proportion of productive valley type habitat.

The *Middle Fork Salmon MPG* includes nine populations, all of which are extant. One population (Lower Middle Fork Tributaries) was rated as Very Large based on the historical intrinsic potential analysis. Three of the populations are classified as Intermediate in size (Bear Valley, the Upper Middle Fork tributaries and the Chamberlain Creek complex). The MPG viability guidelines developed by the ICTRT would require five populations in this grouping exceed VSP criteria, including the single Large and at least two of the Intermediate size category. Spring chinook adult life history pattern predominates in this MPG, although two populations (Big Creek and Loon Creek) include spring and summer run types. At least one of these two populations should exceed VSP criteria under the draft ICTRT guidelines. The elevation range occupied by the Middle Fork populations is similar to that for the Upper Salmon MPG - median spawning elevations for populations ranging from approximately 1200 m to 2000 m.

The *South Fork Salmon MPG* includes four populations, three falling into the Intermediate size category and one (South Fork Salmon River mainstem) into the Large classification. The Little Salmon River population is listed in this grouping because of its geographic proximity. Two of the populations should exceed VSP guidelines. The South Fork populations range from

approximately 1200 m to 1800 m in median spawning elevation. The Little Fork Salmon median elevation is considerably lower - approximately 700 m.

The *Grande Ronde/Imnaha River MPG* includes 8 populations, one of which, Lookingglass Creek, was recently extirpated. Three populations, the Upper Grande Ronde River, Catherine Creek and the Wallowa/Lostine system, were classified as Large. Three additional populations (Imnaha River, Minam River and Wenaha River) were rated in the Intermediate size category. The remaining two populations in this MPG fall into the Basic size category. Most populations in this grouping are classified as spring run adult timing - the exception being the Imnaha River spring/summer run population. The primary ecoregion associated with populations in this MPG is the Blue Mountain province. MPG guidelines would require that four out of the eight populations in this grouping exceed population level VSP criteria. At least three of the four should be from the Intermediate or Large size categories, with minimum of one being from the Large rating. The Imnaha River, given its unique run timing patterns, should also be included among the populations meeting viability criteria. Population median spawning elevations within this MPG range from 600 to 1000 m.

The *Lower Snake Tributary MPG* includes two historical populations - the Tucannon and Asotin Rivers. The Tucannon River is rated as Intermediate in size based on historical habitat potential. The status of the Asotin River endemic population is uncertain. The stock history of the relatively small number of spawners reported for the basin is not known.

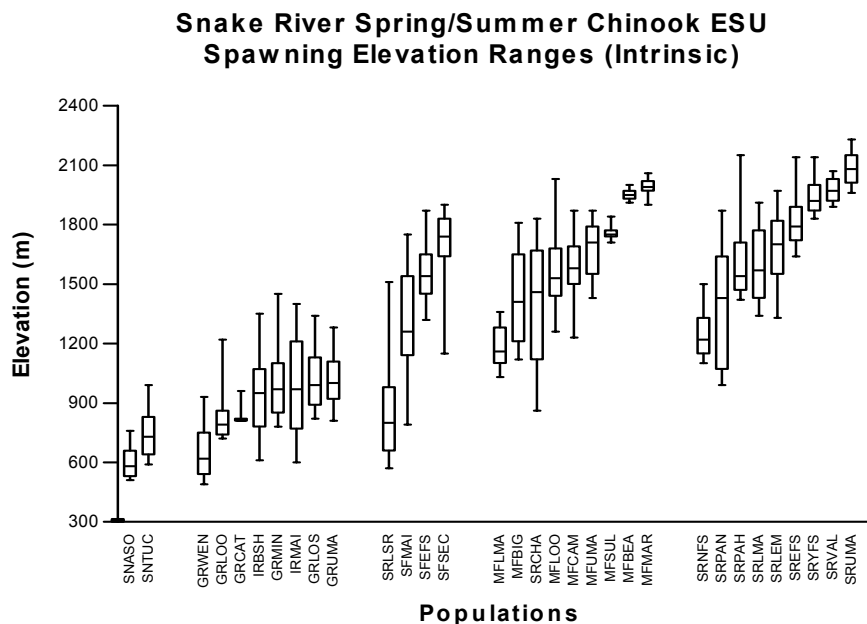


Figure E-2

**Table E-2: Summary of population characteristics by Major Population Grouping.
Organized by Major Population Groupings.**

Major Population Group	Population	Weighted Area Category	Dominant Ecoregion	Life History (adults)	Median Spawning Elev.	Valley Habitat (prop.)
<i>Lower Snake</i>	Tucannon R.	Intermediate	Columbia Plateau	Spring	730	.59
	Asotin R.	Basic	Columbia Plateau	Spring	580	.33
<i>Grande Ronde/Imnaha</i>	Lostine/Wallowa R.	Large	Blue Mountains	Spring	990	.61
	Upper Grande Ronde	Large	Blue Mountains	Spring	1000	.50
	Catherine Creek	Large	Blue Mountains	Spring	810	.90
	Imnaha R. Mainstem	Intermediate	Blue Mountains	Spring/Sum	970	.26
	Minam R.	Intermediate	Blue Mountains	Spring	970	.19
	Wenaha R.	Intermediate	Blue Mountains	Spring	620	.15
	Big Sheep Cr.	Basic	Blue Mountains	Spring	950	.36
	Lookingglass Cr.	Basic	Blue Mountains	Spring	790	.25
<i>South Fork Salmon</i>	South Fk Mainstem	Large	Idaho Batholith	Summer	1260	.13
	Secesh R.	Intermediate	Idaho Batholith	Summer	1740	.46
	East Fk/Johnson Cr.	Intermediate	Idaho Batholith	Summer	1540	.34
	Little Salmon R.	Intermediate	Blue Mountains	Spring/Sum	800	.09
<i>Middle Fork Salmon</i>	Big Creek	Large	Idaho Batholith	Spring/Sum	1410	.10
	Bear Valley	Intermediate	Idaho Batholith	Spring	1950	.85
	Upper Mainstem MF	Intermediate	Idaho Batholith	Spring	1710	.20
	Chamberlain Cr.	Intermediate	Idaho Batholith	Spring	1460	.17
	Camas Creek	Basic	Idaho Batholith	Spring	1580	.19
	Loon Creek	Basic	Idaho Batholith	Spring/Sum	1530	.18
	Marsh Creek	Basic	Idaho Batholith	Spring	1990	.76
	Lower Mainstem MF	Basic	Idaho Batholith	Spring	1160	.04
	Sulphur Creek	Basic	Idaho Batholith	Spring	1750	---
<i>Upper Salmon</i>	Lemhi	Very Large	Middle Rockies	Spring	1700	.78
	Lower Mainstem	Very Large	Middle Rockies	Spring/Sum	1570	.24
	Pahsimeroi	Large	Middle Rockies	Summer	1540	.89
	Upper Sal. East Fk	Large	Middle Rockies	Spring/Sum	1790	.43
	Upper Salmon Main	Intermediate	Idaho Batholith	Spring	2080	.88
	<i>Panther Cr (ext)</i>	Intermediate	Idaho Batholith	Spring	1430	.14
	Valley Cr.	Basic	Idaho Batholith	Spring	1970	.91
	Yankee Fork	Basic	Idaho Batholith	Spring	1920	.40
	North Fork Salmon	Basic	Idaho Batholith	Spring	1220	.15

Upper Columbia Steelhead ESU

Four Upper Columbia steelhead population areas remain accessible to anadromous fish. Chief Joseph Dam, on the mainstem Columbia River upstream of the Okanogan River confluence, is a block to anadromous migration. The ICTRT has identified at least four separate areas above the block that could have supported additional populations, based on intrinsic potential analysis. In addition, Crab Creek, a tributary to the mainstem Columbia between the Yakima and Wenatchee River basins may have been a historical population. The degree to which Crab Creek supported a viable anadromous component is not known.

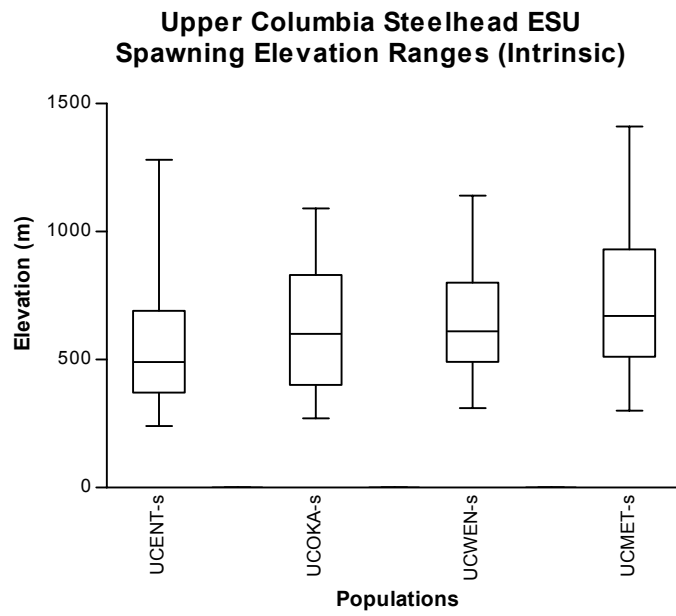
The *North Cascades MPG* includes the Wenatchee, Methow and Entiat River populations. The Wenatchee and Methow are classified as Intermediate in size using the ICTRT guidelines, the Entiat River population falls into the Basic category. Given the relatively small number of populations in this grouping and the loss of the anadromous component from upstream populations, the ICTRT is recommending that all three of the extant populations in this grouping meet viability criteria.

Intrinsic potential analysis indicates that the Okanogan River had sufficient habitat to be classified as an Intermediate population. Small numbers of naturally produced steelhead have been documented returning to the Okanogan River. The stock origin of those returns is not clear. Large numbers of outside origin hatchery smolts have been released into the basin on an annual basis. Given the relatively small number of remaining populations in this ESU, establishing a functional population in the Okanogan River would contribute significantly to ESU viability.

Table E-3: Upper Columbia River Steelhead ESU Population characteristics.

Major Population Group	Population	Weighted Area Category	Dominant Ecoregion	Life History (adults)	Median Spawning Elev.
<i>Eastern Cascades</i>	Wenatchee River	Large	North Cascades	Summer A	610
	Methow River	Large	North Cascades	Summer A	670
	Okanogan River	Intermediate	Columbia Plateau	Summer A	600
	Entiat River	Basic	North Cascades	Summer A	490
	Crab Creek			Resident??	

Figure E-3



SNAKE R. STEELHEAD ESU

The Snake River Steelhead ESU includes 26 extant *O. mykiss* populations including anadromous steelhead distributed among six Major Populations Groupings. Four of those groupings include four or more populations each. The historical Snake River Steelhead ESU extended above the Hells Canyon Dam complex. Habitat analyses and historical records of fish presence indicate that the area above Hells Canyon Dam could have supported several additional anadromous populations.

Major Population Groupings

The *Salmon River MPG* includes twelve steelhead populations. This grouping includes both A and B type steelhead with associated resident fish components. Two populations, the Upper Middle Fork (and tributaries) and the Lower Middle Fork (and tributaries), fall into the Large size category. Two populations fall into the basic size category. Eight populations in this grouping are classified as Intermediate in size based on estimated historical spawning habitat including one, Chamberlain Creek, that consists of a core spawning area and associated downstream mainstem Salmon River tributaries. Populations within this grouping cover a wide range of spawning elevations. Nine populations have a median spawning elevation above 1500 m.

The draft ICTRT ESU/MPG viability criteria would require that a minimum of six populations in this group be rated as viable based on population level criteria. The set of viable populations in this grouping would need to include proportional representation of the Large and Intermediate size categories, as well as A and B type adult life history patterns.

The *Clearwater MPG* includes five extant populations that include anadromous components and one population that is inaccessible to steelhead (North Fork Clearwater River). Historically this MPG included three populations rated as large, one rated as Very Large (North Fork), one intermediate sized population and one population in the Basic size category. The predominant life history pattern among Clearwater populations is B type adult size/run timing. Two populations in this group, Lolo Creek and the Lower Mainstem, include the A type steelhead life history pattern. Median spawning potential elevations for populations within the Clearwater MPG range from approximately 500 m to 1200m. The predominate ecoregion for populations within this MPG is generally the Idaho Batholith, the Lower Mainstem population includes historical production areas that fall largely within the Northern Rockies province.

The draft ICTRT ESU/MPG viability criteria would require that a minimum of 3 populations in this group be rated as viable based on population level criteria. The set of viable populations in this grouping would need to include proportional representation of the Large and Intermediate size categories, as well as A and B type adult life history patterns.

The *Grande Ronde MPG* includes four populations, one of which is rated as Large, the remainder as Intermediate in size. Managers believe that the populations in this grouping exhibit the A type adult life history characteristics. Median spawning elevations for Grande Ronde steelhead populations range from approximately 800 m to 1100 m. The predominate ecoregion for populations in this MPG is the Blue Mountain province.

The draft ICTRT ESU/MPG viability criteria would require that a minimum of 2 populations in this group be rated as viable based on population level criteria. The set of viable populations in this grouping should include the Upper Grande Ronde population, rated as Large based on historical intrinsic potential.

The *Imnaha River* is geographically associated with this grouping but was classified as a separate population by the ICTRT, based on substantial separation indicated by results from genetic analyses. The median spawning elevation of the Imnaha River population is projected to be approximately 1000 m. To meet ICTRT viability criteria, this population would have to meet population-level viability criteria.

The *Lower Snake River MPG* identified by the ICTRT includes two historical populations, the Tucannon and Asotin Rivers respectively. Both populations in this grouping are classified as A type steelhead. Both populations were rated in the Intermediate size category based on historical intrinsic potential. These two basins are at relatively low elevation (average spawning elevation approximately 500 meters above sea level). The dominant ecoregion for both populations is the Columbia River Plateau.

The ICTRT identified the small tributaries entering the mainstem in the Hells Canyon Reach as a separate population distinct from the MPGs described above. Historically, these tributaries may have been part of a larger population complex including core production areas that are currently blocked off by the Hells Canyon Dam complex.

Figure E-4

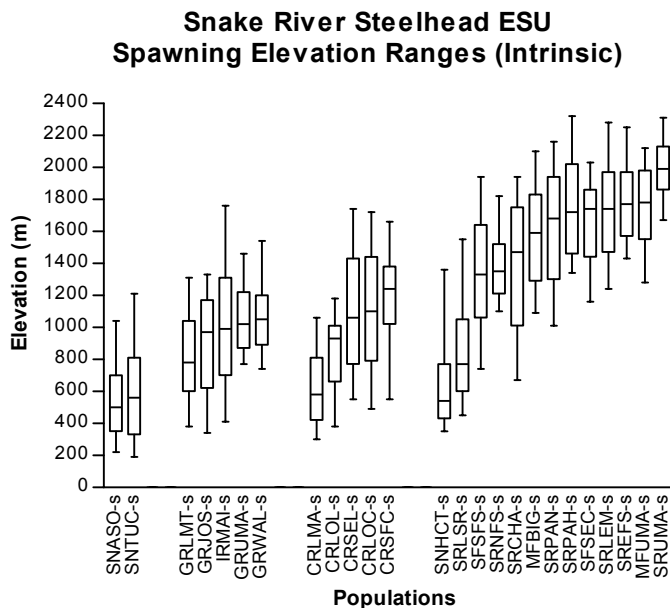


Table E-4. Snake River Steelhead ESU population characteristics. Organized by Major Population Groupings.

Major Population Grouping	Population	Weighted Area Category	Dominant Ecoregion	Life History (adults)	Median Spawning Elev.
<i>Lower Snake</i>	Tucannon R	Intermediate	Columbia Plateau	A type	560
	Asotin R.	Intermediate*	Columbia Plateau	A type	500
<i>Grande Ronde</i>	Upp. Grande Ronde	Large	Blue Mountains	A type	1020
	Wallowa River	Intermediate	Blue Mountains	A type	360
	Lower Grande Ronde	Intermediate	Blue Mountainis	A type	780
	Joseph Creek	Intermediate	Blue Mountains	A type	970
<i>Imnaha River</i>	Imnaha River	Intermediate	Blue Mountains	A type	990
<i>Clearwater River</i>	Lower Mainstem	Large	Northern Rockies	A type	580
	Lochsa River	Large	Idaho Batholith	B type	1100
	Selway River	Large	Idaho Batholith	B type	1060
	South Fork	Intermediate	Idaho Batholith	???	1240
	Lolo Creek	Basic	Northern Rockies	A&B	930
	<i>North Fork (blocked)</i>	Very Large	Idaho Batholith	---	950
<i>Salmon River</i>	Upper Middle Fork	Large	Idaho Batholith	B type	1780
	Lower Middle Fork	Large	Idaho Batholith	B type	1590
	Lemhi	Intermediate	Middle Rockies	B type	1740
	Upper Salmon East Fk	Intermediate	Middle Rockies	B type	1770
	Upper Salmon Mainstem	Intermediate	Idaho Batholith	B type	1990
	Chamberlain Cr.	Intermediate	Idaho Batholith	A type	1470
	Pahsimeroi River	Intermediate	Middle Rockies	B type	1720
	Panther Cr	Intermediate	Idaho Batholith	B type	1680
	Little Salmon River	Intermediate	Blue Mountains	A type	770
	South Fork	Intermediate	Idaho Batholith	A type	1330
	Secesh R.	Basic	Idaho Batholith	A type	1740
	North Fork	Basic	Idaho Batholith	B type	1350
<i>Hells Canyon Tributaries</i>	Wild Horse/Powder R.	Note: Core spawning areas for this population are blocked to anadromous migration.	Blue Mountains	A type	540

Middle Columbia Steelhead ESU

The ICTRT has identified 17 extant *O. mykiss* populations that include anadromous steelhead in the Mid-Columbia ESU, falling into four Major Population Groupings. The White Salmon River historically supported a steelhead population in habitat currently cut off by Conduit Dam. The upper Deschutes drainages, also currently inaccessible to anadromous steelhead, supported one or more populations. The Major Population Groupings within this ESU were influenced by a wide range of habitat and climatic conditions.

Cascades Eastern Slope Tributaries MPG Is the lowermost of the four Mid-Columbia Steelhead population groups, with five identified populations including the extirpated White Salmon River. The upper Deschutes may have historically supported two or more additional populations. The Klickitat River and the Westside Deschutes populations fell into the Large population category based on historical intrinsic potential analysis. Rock Creek is in the Basic size category. The remaining populations are Intermediate in terms of historical spawning habitat. All populations in this grouping included the summer run adult timing pattern, the Klickitat and Fifteen Mile Creek also support winter run population components. Median spawning elevations range from approximately 500 m to 800 m. The dominant ecoregion varies considerably among populations within this grouping - four populations are predominately in the Eastern Cascades, one each in the Blue Mountains and the Columbia Plateau ecoregions.

Meeting the draft ICTRT MPG criteria would require that at least 3 of the five populations (note: including consideration of lost anadromous component above Pelton would increase this to 4) in this grouping to exceed population level viability objectives. At least one population exhibiting both summer and winter adult run timing patterns should be included. The Klickitat River population should be included based on its historical size and diversity.

The *John Day Drainage MPG* includes five populations. All populations in this grouping are classified as summer run and have the Blue Mountains as the dominant ecoregion. The Lower Mainstem John Day tributaries population was ranked as Very Large and the North Fork John Day classified as Large. Two of the remaining populations were classified as intermediate, one as Basic (South Fork John Day). Four of the populations have median spawning elevation (intrinsic potential) of approximately 1000 m. The remaining population, the Lower Mainstem, has a median spawning elevation of approximately 700 m.

The MPG criteria require that three populations meet or exceed population level viability criteria, with the remaining extant populations being maintained. The populations rated as viable should include either the North Fork or the Lower mainstem.

The *Umatilla/Walla Walla Drainage MPG* includes three populations. The Umatilla River is rated as a Very Large population based on estimated historical intrinsic habitat potential, while the mainstem Walla-Walla and the Touchet River populations are in the Intermediate size category. All three populations have the Columbia Plateau as a dominant ecoregions. Median spawning elevations for this MPG are relatively low, approximately 400-600 m.

The MPG criteria require that two of three populations meet or exceed viability criteria, including the Umatilla River (Large population size).

The *Yakima Drainage MPG* includes four extant populations. The Upper Yakima River and the Naches River populations are classified as Very Large and Large, respectively, based on estimated historical intrinsic habitat potential. The remaining two extant populations (Satus Creek and Toppenish Creek) fall into the Intermediate category. Recent studies have indicated that a major section of the mainstem Yakima may have historically supported large numbers of steelhead. Production from that habitat may have been a fourth population, or may have been an important production component in the Upper Yakima population. Median spawning elevations range from 600 to 800 m for populations in this grouping.

The ICTRT MPG criteria would require that two of three populations meet or exceed viability criteria, including either the Naches River or Upper Yakima (Very Large/Large population size).

Table E-5: Middle Columbia Steelhead ESU population characteristics. Organized by Major Population Groupings.

Major Population Group	Population	Weighted Area Category	Dominant Ecoregion	Life History (adults)	Median Spawning Elev.
<i>Eastern Cascades</i>	Deschutes (westside)	Large	Eastern Cascades	Summer	820
	Klickitat River	Large	Eastern Cascades	Sum & Win	640
	Deschutes (eastside)	Intermediate	Blue Mountains	Summer	610
	Fifteen Mile Creek	Intermediate	Eastern Cascades	Sum & Win	380
	Rock Creek	Basic	Eastern Cascades	Summer	400
	White Salmon (sthd ext)	Intermediate	Eastern Cascades	Summer??	520
<i>Yakima River</i>	Upper Yakima River	Very Large	Northern Cascades	Summer	680
	Naches River	Large	Eastern Cascades	Summer	800
	Toppenish River	Intermediate	Eastern Cascades	Summer	540
	Satus Creek	Intermediate	Columbia Plateau	Summer	540
<i>John Day River</i>	John Day Lower Main	Very Large	Blue Mountains	Summer	670
	John Day North Fork	Large	Blue Mountains	Summer	1100
	John Day Upper Main	Intermediate	Blue Mountains	Summer	1080
	John Day Middle Fork	Intermediate	Blue Mountains	Summer	1070
	John Day South Fork	Basic	Blue Mountains	Summer	1220
<i>Umatilla/Walla Walla</i>	Umatilla River	Very Large	Columbia Plateau	Summer	570
	Walla-Walla Main	Intermediate	Columbia Plateau	Summer	360
	Touchet River	Intermediate	Columbia Plateau	Summer	510
	Willow Cr. (sthd ext)		Columbia Plateau		

Figure E-5

